

THE PSYCHOLOGICAL BULLETIN

INTELLIGENCE TESTS

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This summary covers the year 1934, together with some earlier references omitted in previous summaries. In general the volume of work in this field seems to be about the same in amount as during the past few years. No strikingly new developments, either in theory or technique, have occurred. The major interest in psychological testing seems to have shifted from intelligence to personality tests. Intelligence tests remain, however, as standard instruments for use in many practical situations and they are assumed as necessary tools in many fields of research.

General. It has become now almost universal to include a chapter or two on intelligence testing in textbooks on educational psychology and child development. Sometimes such chapters are very brief and inadequate; at other times they give a fair picture of the field. Sometimes intelligence testing is treated as an integral part of the psychologist's attempt to describe and understand the whole nature of man; at other times intelligence testing is treated as if it were a passing fad and the treatment of the subject, mixed up with statistics, is added to the book as a kind of addendum.

Stoddard and Wellman's (142) book on child psychology gives extended space to the results of intelligence testing, particularly with reference to the pre-school child. Garrison (50) has a rather brief treatment in his psychology of adolescence. Brief chapters on our field are included in the texts of Fletcher (44) and of Hines (61). Freeman's (46) book on individual differences makes much use of the results of intelligence testing and many phases of the whole field are very thoroughly covered. In Reusser's (117) workbook on tests and measurements there is one chapter on intelligence testing with appropriate exercises and references. The whole problem of examinations in France, with reference to intelligence in this connection, is discussed by Laugier,

Piéron *et al.* (78). Casanova (17) gives an account of intelligence testing in Latin-American countries. Many revisions of the Binet have been published, but few thoroughly standardized. About 24 different American and European intelligence tests have been translated or adapted. There have been very few attempts at making new intelligence tests.

An historical note by Goodenough (54) is of interest. In 1887 Chaille published standards for each month of the first year of life and then for other periods up to 36 months. "Eyes following a candle" is one of his tests. He seems to have had the idea of an age scale before Binet. Pintner (111) gives a summary of intelligence testing for 1933 with a bibliography of 175 titles.

The Meaning of Intelligence. Spearman (138, 139) concludes his articles on the criticisms of his general factor theory. Schiller (129) finds verbal, numerical, and spatial central factors in an analysis of 12 tests given to about 400 children homogeneous in age, parentage, and schooling. There is also a central common factor running through all the tests which may be Spearman's "g". What is meant by the word "normal" in intelligence testing is discussed by Edwards (34), who finds the percentage of so-called normal individuals ranging from 39 to 65 in various published reports. He concludes that the use of the word "normal" is undesirable.

Validity and reliability are discussed in 3 reports.

Turney (151) proposes validation by means of Spearman's tetrad technique and correlation with "g". Stutsman (144) considers the different factors which must be taken into account when reporting the reliability of a test, such as the age range of the group tested, the interval between tests, and the number of times the test has been given, and these conditions are illustrated by results on the Merrill-Palmer Scale with pre-school children. Davis and Campbell (27) propose a more valid method of comparing the accomplishment quotient of an individual with those of a group. The difference between the actual and expected A.Q., as determined by the regression line of I.Q. on A.Q., is recommended.

Relation of Intelligence to Other Factors. The general problem of speed and level of intelligence is discussed by Tinker (149). The article is theoretical and presents no new data. Memory in young children is investigated by Bryan (10). She deals with 200 cases, ages 5 to 6, I.Q.'s 60 to 139. She finds a common factor in her 11 memory tests. The average correlation between intelligence and the memory tests is .45, hence intelligence in young children may be essentially memory. "Memory and verbal ability combine to form the matrix for later intellectual development." The various relations found between verbal and non-verbal intelligence, mechanical ability, and manual dexterity are reported by Attenborough and Farber (2).

Personality tests, measuring emotional stability or adjustment, do not correlate much with intelligence tests.

For college students Thompson (145) reports correlations of $-.11$ and $.06$; for penitentiary men, Simpson (135) reports $-.05$; for high school and college students, Koch and Stroud (75) report correlations from $.12$ to $-.05$; for 1,663 children in Grades IV to IX, Brown (9) finds a correlation of $-.11$ between psychoneurotic score and M.A. All these reports substantiate a great number of similar studies published in previous years.

Attitudes, as measured by specific scales, may correlate more highly with intelligence tests.

It depends very much upon the population tested. Thus Carlson (14) finds positive correlations with scales measuring pacificism, communism, and birth control, but no correlation with prohibition and a negative correlation with belief in God. Uhrbrock (152), working with employees of a large manufacturing company, finds a correlation of $-.14$ between intelligence and favorable attitude towards the company as checked on an attitude scale.

Perseveration and intelligence are dealt with in 3 studies (Cattell, 18; Rogers, 122; Line, 82). None of them finds any correlation with intelligence. Line further compares the Pintner Intelligence Test and the N.I.T. Rogers believes perseveration is related to disparity between intelligence and achievement. High and low perseverators are either above or below in achievement as compared with intelligence.

Persistency in a task, as measured by various games and puzzles, correlates $.30$ with I.Q. according to Crutcher (24), who tested 83 children ranging in age from 7 to 16. Wrightstone (161) reports a correlation of $.11$ between civic beliefs and intelligence, and also (162) a correlation of $.32$ between natural science and intelligence. The more intelligent are less likely to hold improbable or superstitious beliefs.

School marks and tests and their relation to intelligence are dealt with in several reports.

Meadows (96) finds that scores in a college class in educational psychology correlate only $.35$ with intelligence, whereas teachers' ratings of traits correlate $.62$ with marks. He believes the ratings are more reliable and more important than the intelligence test scores. Moore and Trafton (99) gave correlations between first semester ranks in college and 7 intelligence tests and these range from $.13$ to $.55$. Intelligence and marks in college correlate $.51$ (Broom, 8). Intelligence and chemistry in college correlate $.45$, physics $.49$, and biology $.43$, according to Rogers (121), while Reusser *et al.* (118) find that the Iowa Chemistry Aptitude Test correlates better with marks ($.57$) than

does an intelligence test (.40). Kilzer (72) finds a correlation of .71 between intelligence and marks in an education course.

Russell (124) finds a correlation of .53 between school work at the secondary level and intelligence as tested 5 years previously among a group of English school children. In Australia, Cunningham and Price (25) report on a standardized Australian Arithmetic Test and give the following correlations for 300 cases: between intelligence and addition .39, subtraction .41, multiplication .45, division .55, mechanical arithmetic .60, arithmetical problems .78, and the total test .66. Children were tested on an intelligence test at the end of the kindergarten year and these scores were then correlated with reading scores in the first grade by Woolf (160), who found correlations from .21 to .30. In Brazil, Lourenço Filho (86) reports on his tests for reading readiness. They correlate low with intelligence (Binet M.A.), about .17, and he believes they predict readiness for training in reading and writing.

The relation between intelligence and French vocabulary tests in first-year French is about .60, according to Robson (120), while Dexter (30) finds that I.Q. among high school girls and ratings of French accent correlate .59. Carroll (15) finds that his prose appreciation test correlates about .40 with intelligence. Futch (48) reports correlations between I.Q. and eye movements in reading Latin and in reading English. The correlations are higher for English than for Latin. Hurlock and Thomson (65) report on a classification of over 2,000 drawings of children, ages 4 to 8, and find that certain aspects of these drawings show increases with intelligence, such as tendency to perceive details, to perceive background, etc.

Certain physical factors and intelligence are dealt with in 6 reports.

Stedman (140) analyzes the health records of 450 high school students and finds those free from defects to have the highest mean I.Q. The mean I.Q. of those with lung defects is the lowest, but there are very few cases. Whether these mean differences are reliable is not stated. Intelligence and age of first menstruation show no correlation according to Stone and Barker (143) in their report on about 600 college women. Fitt and O'Halloran (43) find a slight relationship between left-handedness and lack of intelligence. Maller (90) presents further data on physical factors and I.Q. from the survey of 100,000 fifth grade children in New York City. He reports *negative* correlations between I.Q. and visual defect .40; defective teeth .50; defective tonsils .26; malnutrition .28; death rate .43; infant mortality .51; juvenile delinquency .57; birth rate .34. In his comprehensive treatment of physical growth, Sanders (126) gives a good summary of most of the work dealing with relation of intelligence to height and weight. Richey (119) studied the effect of having diseased tonsils and adenoids removed by comparing tests given before and after. Two groups were compared, those who had an operation and those who had not, but needed attention. No reliable or significant differences between the two groups were found.

Growth and Regularity of Growth. There were last year no general studies of growth dealing with large populations at different

ages. Most of the studies deal with retests after various time intervals.

Miles (98) followed up the previous work by re-testing after a two-year interval 190 persons between the ages of 25 and 89. She finds a decline in score very much as predicted by the original results. Speed declines faster than power until about age 60, when the reverse seems to take place. Scores on purely information items rise up to the forties or fifties. College students continue to make appreciable gains on the Thorndike Intelligence Test after an interval of 2 years, according to Masters and Upshall (92), who re-tested 125, and they raise the question whether intelligence growth stops in the teens or whether the test is a good measure of intelligence. Similarly McConnell (93) finds a reliable gain in 70 college students on the American Council Test. After $4\frac{1}{2}$ years the gain is 40 points, and the re-test correlation is .85. He suggests that this gain may be due to growth of intelligence or the better use of intelligence or better motivation after a college career or specific training in college. Re-tests with the Otis Higher Test 1 to 3 years apart give correlations from .65 to .81, according to Traxler (150), and Lorge (85) reports correlations from .57 to .66 for tests given after a ten-year interval. Seagoe (132) finds the I.Q. to be fairly constant after intervals of 1 to 3 years even with different tests. His correlations range from .52 to .87 with an average about .70. Line and Kaplan (81) find that the I.Q.'s of pre-school children tend to increase from age 1 to age 5, and that correlations between tests decrease with increase in time interval. Rappaport (115) gives results for initial test on Stanford-Binet before age 14 and final test after age 14. He shows that the highest correlation of .88 is obtained by using age 15 as the divisor for calculating I.Q., and that this divisor also gives the closest agreement in average I.Q. between initial and final test. In Germany, Lämmermann (76) reports a correlation of .86 between 2 different sets of tests 2 years apart for a group of about 50 nine-year-olds.

Individual and Group Tests. Some new tests and modifications of old tests have appeared. Cornell and Coxe (22) present a new performance test. It consists of 6 well-known performance tests. It is given with verbal directions and could not well be used in foreign countries. For a wide age range, from 5 to 14, it correlates .79 with the Binet. A re-test reliability after 11 months of .93 is reported. Atwell and Wells (3) present a short form of the Army Alpha in the shape of a sixteen-minute test, which may be useful for survey purposes. Kent (71) has published a written test for individual use, good for patients who do not respond to oral questioning. It can be given with or without time limits, and it should prove useful in many circumstances. Schultz and Macvaugh (130) have revised the Chapman Oral Intelligence Test. It is a group test given orally. A new method of presentation and new norms for the Lincoln Hollow Square Form Board have been published by Ehrenfest and

Kendall (35), and a new standardization of a modified shortened series of the Kohs Block Design Test has been prepared by Kent (70).

In foreign countries a standardization of the Stanford-Binet for Norwegian children has been prepared by Lofthus (83). Kamat (69) has published a Binet Scale for Indian children, and given it to over 1,000 cases with a mean I.Q. of 99.80 and a sigma of 18.70. The Vermeulen Tests have been used by Fischgold (42), who proposes a new method of interpreting the profiles. Oliver (105) reports on simple picture and number tests for use in tropical Africa.

Discussions of certain aspects of old tests have appeared.

Burnside (11) compares the complete and abbreviated scales of the Stanford Revision. He finds the differences in I.Q. resulting from the 2 scales and concludes that it is safer to use the complete scale. Wallin (153) presents data on Years VIII and IX of the Stanford Revision and concludes that the tests at these 2 age levels need thorough revision. The standardization of the Kuhlmann Binet is probably better than the Stanford, according to the findings of Finch (40). Mahan (89) proposes a re-standardization of the Arthur Performance Scale, and Knight (74) compares results on this scale with results on the Stanford-Binet. Line and Ford (80) present some results on the Knox Cube Test, find that it measures general intelligence rather poorly, and suggest that it may perhaps be related to perseveration. O'Connor (104), in his book devoted to measurement, gives a detailed discussion of such tests as the Free Association Test, the Inglis Vocabulary, and the like. Thurstone and Thurstone (148) give results for the tenth edition of the American Council Psychological Examination given to 121,757 students in 399 colleges.

The School Pupil. The problem of homogeneous grouping is still being debated.

Sauvain (127) canvasses the opinions of teachers and parents. He finds that 90% of teachers favor the retention of ability grouping. Feingold (38) describes a type of homogeneous grouping in high school which he has used for 15 years and reports an increase in correlation between intelligence and educational achievement over this period of time. McElwee (94) discusses the problem of homogeneous grouping in special classes for the dull and backward. If such grouping were made on the basis of mental age and reading it would leave 50% misplaced in arithmetic.

The Educational Records Bureau (33) presents the results of its 1934 Fall testing program, which includes results from several intelligence tests given in many private schools. Farley *et al.* (37) tested 193 twelve-year-old pupils in Grades IV to VIII and found a correlation of .77 between M.A. and grade placement. Other correlations with I.Q. and educational achievement are reported, and it is concluded that these children are in general well placed according to ability and achievement. In England Hughes (64) reports results

of intelligence and scholarship examinations given to many children. He examines in detail 120 cases of marked discrepancy between the 2 tests. Those high in intelligence and low in examinations suffer from many extraneous handicaps in regard to home, health, attendance, and character. Those showing the reverse discrepancy generally come from good homes and are very ambitious. He concludes it is best to have both intelligence tests and examinations for scholarship purposes. In Germany Bobertag (7) emphasizes the value of intelligence tests for school selection. He shows the grading of essays and examinations to be very subjective, presents the results of scoring by different teachers and points to the need for standardized educational achievement tests.

The College Student. Ten articles deal with the college student. Thompson's (146) questionnaire resulted in replies from 193 colleges, and 55% of these reported noting gains in the intelligence score of freshmen during the past 3 or 4 years. Such gains, he suggests, may be due to better selection of students during the depression, better counseling in high school, or merely to the fact that students are getting "test-wise". Reeder (116) also notes the increase in intelligence score in a certain college from 1930 to 1933, but an analysis of academic marks shows no increase and he raises the question whether educational standards have increased or whether instructors grade according to fixed schemes. Patterson (108) confirms the well-known fact that students with high I.Q.'s are on the average younger than those with lower I.Q.'s.

Finch and Nemzek (41) give various correlations between intelligence and achievement tests taken during high school and college. Morris (101) finds intelligence correlates about .40 with marks, and .60 between intelligence tests taken as freshmen and again as seniors. Garnett (49) studied 876 freshmen tested by the Thurstone Psychological Examination. He gives the percentage of successful students for various percentile ratings on the intelligence test. Among those receiving a percentile rank of 95 about 85% are successful, whereas of those receiving a percentile of 1 only 6.5% are successful. Students not able to attend college for financial reasons but who wish to do so, and who attend collegiate centers recently established in New York state were tested by Smith (136), who found them much above the O.S.U. norms and well up to the standards of Syracuse University. An investigation by Hillman (60) of 147 students tested as freshmen, who graduated in 1928, showed very little difference between those high in intelligence and those low in intelligence, as to whether they had followed the occupation for which they were trained. The author concludes that the higher the intelligence the less likely is the student to follow the vocation for which he is trained. The annual report on the scholastic aptitude test of the College Entrance Examination Board (20) gives the usual valuable summary of that test. In Germany the policy of restricting

the number of university students has led to psychological testing on a wide scale in Saxony. Wohlfahrt and Hartnacke (159) describe the testing of 3,152 Oberprimaner and 4,519 Untersekunder. The tests are mostly similar to American "intelligence" material, with the exception of some new material supposed to measure imagination, Einfühlung, and so forth. No reliabilities or validities are given, but the scoring and statistical evaluation of the results seem to have been carefully done. On the basis of the results a "quota" of those eligible for the university was assigned to each high school. This brought out the enormous differences in intelligence between various high schools—"quotas" ranging from 10% to 90% of the seniors. Younger students do better than older students. A hierarchy of father's occupation according to intelligence of offspring is similar to the usual finding in this country.

The Superior. A further report on the group of gifted children studied by Hollingworth since 1922 is made by Hollingworth and Kaunitz (63). As measured by the Army Alpha at age 15 and again at 19, these children would seem to have reached their limit of growth at about the age of 15. About 82% of this gifted group fall in the top centile of the general population, and the rest in very high centiles. They do not regress toward average intelligence as they grow older. These gifted children have consistently made high scores on intelligence tests for the last 10 years.

Some studies have shown a much greater proportion of gifted boys than gifted girls, but Witty (156) is inclined to question this finding. He gives the distribution of I.Q.'s for 27,642 children in grades IX to XII and the ratio of boys to girls for the high I.Q. intervals. He does not find more gifted boys than girls. There is no difference in intelligence between the sexes in high school. Two reports deal with individual cases showing high I.Q.'s. Goldberg (53) describes a case with an I.Q. of 196 and McElwee (95) one with an I.Q. of 192. It is to be hoped that both of these cases will be followed into later life.

The Feebleminded and Dull. Coxé (23) describes New York state's program for the education of subnormals in the public schools. The number of such classes has risen from about 350 in 1917 to about 900 in 1933. From South Dakota (137) comes a report of a survey of the feebleminded in that state. A survey of all children between the ages of 6 and 16 shows 1.29% feebleminded. The distribution of the cases according to degree of defect and sex shows a greater number of males and also a greater number of male idiots. This preponderance of males among the feebleminded is also mentioned by Jones (68) in the excellent social survey of Merseyside in England. In 2 studies Parker (106, 107) discusses the development of intelligence in subnormal children from his repeated tests in Tasmania. His table of fluctuations according to the age of the child

at time of testing shows a steady decrease from about 7 to 16 years. There is a slight decline in the I.Q. of subnormals over a period of 4 years. Children who are mentally deficient because of birth lesions profit much from physical and mental training, according to Martz and Irvine (91), who found that 17 out of 18 made increases in I.Q.

The Merrill-Palmer Scale is well adapted to the testing of idiots and imbeciles. Gordon (55) gives the results for 254 cases so tested. They are more retarded on the verbal than on the performance items of the scale. For 54 cases the correlation between this scale and the Binet is .30. Earl (32) tries out the Goodenough drawing test with defective adults and reports a correlation with the Binet of .48 for 113 cases.

Delinquents and Problem Cases. Glueck and Glueck (51, 52) have published two notable books in this field. One gives the details about 500 delinquent women. Intelligence tests would diagnose about 34% of these as feeble-minded, *i.e.*, I.Q.'s below 70. The authors write "only 6.6 per cent are of normal intelligence and without emotional imbalance or abnormalities". The other book deals with juvenile delinquents brought before the juvenile court. Thirteen per cent are mentally defective, *i.e.*, with I.Q.'s below 70, an additional 17% are called borderline and another 28% are dull. Only 42% have I.Q.'s above 90. The authors find that the results up to the present time of juvenile court and psychological clinic treatment are very disappointing. During a five-year period after court treatment 88% of the children continued their delinquencies. Reformatory boys according to Caldwell (13) test very low in verbal intelligence. Out of 3,279 tested by the Morgan Mental Test, 47.5% test below 68 I.Q. Only 16% test average or above in intelligence. Lane and Witty (77) study 621 reformatory boys with an average I.Q. of 88 and find the average M.A. to be 12-9 and the average E.A. to be 11-6. They believe these boys are not motivated to use their ability fully and they find great improvement in educational test scores after systematic teaching.

The average I.Q. of 3,584 cases appearing before the Toronto Juvenile Court during 11 years is 82.20, according to Rogers and Austin (123). They call 13.9% mentally deficient and an additional 59.7% subnormal. Correlations for re-tests at intervals of 1 to 5 years range from .63 to .82. Steinbach (141) and Cochran and Steinbach (19) report on small groups appearing before the Norfolk Juvenile Court. They believe that mental ability is not as important as home conditions as a causative factor in delinquency.

Moore (100) finds a median of I.Q. of 86 for 2,947 problem boys. Less than 2% are above normal in intelligence. These boys are also below

average physically and also in mechanical aptitude. In a survey of pre-delinquent children, Williams (154) finds 16.8% with I.Q.'s below 70. Jastak (67) gives Binet, performance and group tests to 356 cases. He finds vocabulary not affected by mental instability, but the more complex performance tests are affected. Performance tests require mental control and this is what the psychopath lacks. He believes that mental or personality difficulties can be measured by the discrepancy between performance and vocabulary tests. In Belgium, Dellaert (29) reports on 53 cases classed as "debiles moraux" or unstable. The Pintner-Paterson Scale and the Binet both correlate .56 with ratings of social adjustment. Binet correlates higher with school work, but Performance correlates slightly higher with shop work.

The Handicapped. The International Conference on the Education of the Deaf (66) deals with all aspects of this field and Pintner's (110) article in that volume summarizes the psychological tests given to the deaf. Schick (128) reports on the use of the Drever-Collins Scale with deaf children and by one method of calculating M.A. arrives at a mean I.Q. of 105, and by another at a mean I.Q. of 122.

A report on partially sighted children is published by the Board of Education, London, England (36). The incidence of such cases is estimated to be 1 per 1,000 school children. A comparison of such cases with sighted children in a school of similar social type finds no difference in intelligence between the 2 groups, the mean I.Q. being about 93. The report deals in a broad fashion with the whole educational problem of these handicapped children. The whole problem of the blind in the United States is treated by Best (6) in his book on blindness. He summarizes Hayes' work on the intelligence of the blind, finding more feeble-minded and dull among the blind than among the sighted. Very few of the blind are capable of self-support. Only 30% can read raised print. "Two thirds or three quarters of blindness might have been avoided by means known to us." Merry and Merry (97) have used the high relief finger maze with 30 blind children. The correlation with M.A. is about .50 or .60, and they conclude that it forms a useful supplementary intelligence test for blind children.

Berrien (5) finds differences in the test scores of post-encephalitic and psychopathic children, which he believes may be useful for diagnostic purposes. Simmons (134) gives the distribution of I.Q.'s for 2,315 "indigent" hospital cases. The average I.Q. is 84 and 17% are diagnosed as feeble-minded.

Racial Comparisons. There seems to the writer to be an increasing interest in the comparison of children of different countries by means of the same test. We have 2 interesting reports, one from

Australia and one from Scotland. Collmann (21) gave the Otis S-A Test to over 4,000 ten- and eleven-year-old children in Victoria, Australia. A comparison of the scores with the Otis norms in this country shows practical identity. In Scotland, Macgregor (88) gave an American achievement test to all the eleven-year-old pupils in the county of Fife and found them to be considerably ahead of the American norms. The pupils in this county are 4 months ahead in M.A. as compared with the norm for all Scottish children.

In this country, Haught (58) gives results of standard group verbal tests given to Indian children from ages 6 to 16 and finds that the I.Q.'s for the various age groups range from 71 to 87. The mean I.Q. for each age group tends to decrease with increase in age from 6 to 16. Witty and Jenkins (157) report on achievement tests given to 26 negro children with I.Q.'s above 140. A special number of the *Journal of Negro Education* is devoted to the anthropological and psychological differences between negroes and whites. Price (114) summarizes the work on intelligence tests and concludes that there are as yet no reliable results. Daniel (26) summarizes the work with other tests, and finds no reliable differences. Washington does not attract a select group of negroes according to Long (84), who compares children born in that city with those born outside. Pintner (112) and Freeman (45) both discuss the problems arising in connection with intelligence comparisons between negro and white, and Klineberg (73) discusses the cultural factors to be taken into account in assessing negro intelligence.

Employment and Guidance. The outstanding work here is by Thorndike *et al.* (147). Children tested at age 14 were followed up for 8 years and re-tested at age 22. Verbal tests give a better correlation with success in clerical jobs than mechanical tests with success in mechanical work, but neither type of test correlates highly.

Andrew and Paterson (1) report a correlation of .23 between academic intelligence and the Minnesota Vocational Test for Clerical Workers. Fryer and Sparling (47) believe intelligence tests can predict the capacity to learn tasks of various difficulty levels, and they give tentative minimum critical scores on Army Alpha for occupational success of various types of clerical workers.

Sex Differences. The 3 reports on this topic have already been referred to in different connections.

The South Dakota (137) report and the social survey by Jones (68) both agree in finding more male than female feeble-minded. The Witty (156) study finds no difference in intelligence between boys and girls in high school, either in mean or variability, and, furthermore, the ratio of boys to girls with I.Q.'s above 120 is practically one.

Inheritance. Most of the studies deal with twins. Newman (102, 103) reports 2 additional cases of identical twins reared apart. One pair shows a difference of 15 points in I.Q. in favor of the twin with a superior environment. Carter (16) describes a pair of mature identical twins. Herrman and Hogben (59) find a correlation of .84 for identical, about .50 for fraternal twins and .32 for siblings. Byrns (12) finds 188 pairs of twins among 59,500 high school students in the Wisconsin survey. The median percentile of all 376 twins is only 39.4. The correlation for all pairs is .61; for unlike sex pairs .42. Lund (87) gives mental and physical measurements for a set of triplets. The I.Q.'s on several tests are very similar for all of the children. On the Otis Test, Gray and Moshinsky (56) find that sibs correlate .35 and first cousins .16.

Penrose (109) discusses the problem of the inheritance of intelligence by studying 100 families of feebleminded children. He believes the ordinary type of Mendelian inheritance is ruled out. The likeness of children to parents can be accounted for "by the assumption of alternative additive Mendelian genetic factors, a noticeable proportion of which are sex-linked". A *Psychological Abstracts* report of a Russian study by Leventuev (79) of 499 children tested on the Binet, states that at all ages the children of workers fell below those of intellectuals, and this difference became greater with increase in age.

Bilingualism. This problem is treated in 4 studies. Hoffman (62) has contributed a scale for the measurement of bilingual background and reports zero correlations with the Pintner Non-Language Test, but correlations of $-.30$ for Italians and $.20$ for Jews with the Otis Intermediate. Senour (133) gives results of 453 children tested with a verbal and a non-language intelligence test. He concludes that the Pintner Non-Language Test is a better measure than a verbal intelligence test for a bilingual group. Sanchez (125) discusses the results with Spanish-speaking children and criticizes severely the use of English tests. He finds that by giving language training to a second grade group he can raise their I.Q. from 72 to 100. Decroly (28) discusses the findings of the Luxemburg Conference and concludes that for the majority of children bilingualism impedes mental development. The maternal language should be well established first of all and the second language begun about the age of 10.

Miscellaneous Topics. Witty and Theman (158) find that out of 340 universities, 85 maintain psycho-educational clinics. They describe these and in particular the Northwestern University Clinic

and the work done there. Pairs of friends in Grades III to VIII are studied by Seagoe (131), who finds correlations of .67 and .78 for M.A. between pairs. Propinquity in home or grade correlates much higher, and character traits very low. Finch (39) finds that sibs correlate from .34 to .49 in intelligence; however, the correlation between the age interval between the pairs and I.Q. is zero.

Pintner and Forlano (113) find no difference in number of eminent men born during different months of the year. Gurnee (57) carries further the judgment of intelligence from photos. He finds practically zero correlations for such judgments whether made for the whole face or for the eyes, forehead and mouth separately. Witty (155) studies 153 only children of age 5. The mean I.Q. for the boys is 107 and for the girls 109. They show no evidence of more maladjustment than normal. Durost's (31) comprehensive study of handedness goes into the question of intelligence. The right-handed are superior to the left-handed, but the differences are not statistically reliable. Balken and Maurer (4) give a preliminary report on the effect of feeding Vitamin B to 46 kindergarten children. They find gains in I.Q. from about 84 to 88, but there was no control group. In Germany, Zillig (163) asked children to vote for the "five girls you like best". These "best liked" girls ranked higher in intelligence and other desirable traits than did those who obtained few or no votes.

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EDUCATIONAL TESTS

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The purpose of this summary and review is to cover the main developments in educational measurements during the year 1934. A total of 193 references is being included in the bibliography. All of these will be mentioned in the text or referred to by number in appropriate sections so that the reader interested in the articles on any one topic will find ready reference to them in one place. Because of limitations of space it will be impossible to make the summary as intensive and critical at all points as is to be desired; however, by singling out for special attention the most significant trend of the year in the first section and by grouping together for brief mention the other contributions under their respective sections, the writers hope to depict as clearly as possible the activity in the field.

THE MOST SIGNIFICANT TREND

In past years in preparing the summary corresponding to this one the writers have, while collecting and sorting out all studies deserving mention, noted and recorded several main trends and emphases. Sometimes these trends have been identified merely by the number of published studies which have appeared on any topic; more frequently they have been identified on the basis of the importance of the work for stimulating further worthwhile research and applications. If we use the latter criterion this year we find one issue—or perhaps better a difference in emphasis—that stands out clearly above all other matters. It is the issue between objective, reliable, and intensive measurement over a narrower range of ability and achievement on the one hand and more extensive, even if less reliable, measurement over a wider range on the other. This issue has, of course, not appeared suddenly; indeed it has been mentioned before in these annual summaries. But it has appeared in intensified form this year in two separate areas of the field of measurement, and we expect the trend in measurement to be greatly influenced by it. First, and most dramatically, the issue arises in connection with Thorndike's study on the prediction of vocational and educational success and the attack made upon it by exponents of the vocational

guidance movement. Secondly, it arises in connection with the plans of a Committee of the Progressive Education Association to evaluate the work of Progressive Schools.

Thorndike *et al.* (159) obtained in 1922 complete school records and test scores in general intelligence, clerical capacity, and mechanical adroitness for over 2,000 children. These children were about 14 years of age when the study began, and he made a follow-up study of them until they were about 22. Using as his criterion of educational success the grade or level reached in school or college, and as his criteria of vocational success earnings, level of job, and degree of enjoyment of work, he tried to predict success of individuals at age 22 from his facts obtained from them at age 14. He finds that educational success, as here measured, can be predicted with a rather high degree of accuracy. For example, he finds that the grade reached at age 14, 15, or 16, taken in conjunction with length of time which the family plans to keep the child in school will correlate .90 or above with the grade which the individual will reach at a later age. He concludes that the values of certain items of school record and test scores are very great for *educational* prediction and guidance. But he finds the situation to be very different in the field of vocational prediction and guidance—and this brings us closer to our point. In discussing the prediction of success at mechanical or manual work at age 22 which can be made from his facts gathered 8 years earlier, he says that “no combination of facts at age 14 would enable a vocational counselor to foretell much better than he could by a sheer guess how much a boy or girl will earn at mechanical work six or eight years later nor how happy he will be at it”. Somewhat higher *r*'s were found between original measures and success in clerical work, but none upon which safe predictions could be made.

Summing up his results as they bear on vocational guidance he says: “On the whole the vocational histories of these boys and girls are not in accord with the opinions of those enthusiasts for vocational guidance who assume that an examination of a boy or girl of fourteen and a study of his school record will enable a counselor to establish his fitness to succeed in this, that, and the other sort of work. . . . Better predictions than ours can come only from fuller or more suitable data than ours. Such data may consist of objective facts about the child or the counselor's personal impressions of him.” But with regard to the value of the latter, Thorndike suggests that it is the duty of every guidance expert to make a follow-up study of the results attending his advice.

With regard to vocational selection as opposed to vocational guidance, Thorndike takes pains to point out that employers can profit greatly by using tests of intelligence, clerical capacity, and mechanical adroitness in the selection of employees.

These results and conclusions about vocational prediction and guidance have stirred up quite a little controversy. The central point of the controversy, so far as measurement is concerned, seems to be whether or not Thorndike's intensive use of a few objective measures gives predictions at all typical of what would have been obtained if many more factors had been taken into account, even if the accuracy of the measurement of these other factors had been low. Paterson (109) in a calm and well-planned criticism admits the objective and reliable nature of Thorndike's predictive indices and of his criteria of vocational success, but he questions the validity of both. He thinks that, whereas one can find out rather definitely about a worker's earnings, job level and relative interest in the job, these are not valid measures of real competence in the job. Moreover he thinks no competent vocational counselor today would try to give guidance to boys and girls without evidence on a much wider range of topics than Thorndike had. However, he says "the negative character of the evidence will tend to intensify research efforts all along the line".

In contrast to Paterson's cool criticisms is the heated rejoinder of Macrae (93) of the British National Institute of Industrial Psychology. When we clear away all the steam from Macrae's attack it seems that he, like Paterson, is dissatisfied with the criteria which Thorndike used for satisfactory vocational placement and with the measures used in prediction. More than this, however, he seems to have a very different idea of guidance from that of Thorndike, in that Macrae emphasizes the selection of workers who will fit a job more than guidance of individuals into jobs in which they will develop and be happy. "Earnings and job levels", he says, "have nothing to do with the success that we are investigating". He places great reliance upon the personal interview and other factors of unknown reliability, and he is willing to have advice given on the basis of "a very intimate and comprehensive study of characteristics and circumstances". He would be willing to have such information checked with subsequent judgment of whether or not the individuals are "competent and contented". But as for these correlations of Thorndike, "they are", he says, "not at all exciting".

Thorndike (157) replies to the criticisms of Paterson and Macrae, defending his criteria of vocational success, and calling for more

painstaking research to determine the accuracy of prediction embodying all possible measures. "Validity and utility of prediction", he says, "are not a subject for adroit debate, but rather for straightforward determination of facts and their meanings for science and practice". Lorge (91) and Lorge and Metcalfe (92) emphasize and explain further the very low levels of vocational prediction found in the Thorndike study. In the former article it is maintained that, if no relation exists between the best measures of abilities which psychologists have developed and vocational success, then little can be expected of less stable and less reliable measures. Kitson (82) says that the success of vocational guidance does not rest on the success of prediction. The counselor, he says, is expected to help the individual to know about jobs, to evaluate his own assets, and to determine the general education and specific training which will best prepare him for the vocation chosen.

Earle (43) and Strong (148), though not entering into the above debate, stress the importance of including a greater variety of measures in guidance than are now satisfactorily standardized and validated. The former stresses the importance for vocational guidance of measures of physical, mental, and temperamental conditions as determined by school records, by performance on special tests, and by oral interviews with counselors. Strong says that such factors as morale, interest, and purpose are among the most important, if not the most important of all considerations in vocational guidance. Other articles stressing the need for a very broad basis for guidance are those by Pratt (113), O'Brien (105), and Russell (120).

Harris (60), in an attempt to find out how really useful personnel data are in educational prediction and guidance, computed intercorrelations among scholastic grades, age, hours of study, and other data for a homogeneous group of college freshmen. Most of the relationships were found to be negligible and Harris comes to doubt the value of gathering such personnel information. Moffatt (102) criticizes all pre-occupational tests in the skilled trades on the ground of their low accuracy in prediction. Boardman and Finch (11) have analyzed the academic records and vocational histories of 110 students who stood in the lowest 40% of students on a college aptitude rating. They find that such ratings fail in the case of many individuals to give trustworthy predictions of either college or vocational success.

So much for the conflicting demands upon measurement as manifested in the field of vocational and educational guidance. Essentially the same conflict appears in less dramatic but more important form for educational tests in connection with attempts to evaluate the work of schools with widely differing curricula and methods, such, for example, as that in the traditional schools and "Progressive Schools". Here again the issue is between those, on the one hand, who demand

that success be measured in the broad sense and that extensive measures be made irrespective of the technical difficulties in the way of accurate measurement, and those, on the other hand, who insist that objectives be stated in concise terms and that all claims for success await demonstrable proof in terms of exact measurement. There are two reasons why this conflict has come to the fore, particularly during the year under review. First, the Committee on Reports and Records of the Progressive Education Association has begun work, with the aid of a liberal subvention from the General Education Board, in the developing of more comprehensive and satisfactory means of evaluating educational outcomes than are now available.¹ Secondly, an elaborate and challenging report on tests and measurements by the Commission on the Social Studies of the American Historical Association has appeared which serves to stress more convincingly perhaps than any other single volume the issue here being considered. These two research projects will be discussed—in so far as they bear upon this issue—in the order named.

Tyler (172), who is directing the work in devising improved measures in connection with the Progressive Education Association study, clearly realizes the difficulty of defining many of the objectives of the Progressive Schools in sufficiently exact form to enable him to measure them with a reasonable degree of accuracy. Yet he thinks that the evaluation of the contribution which a school makes to its students should not consist exclusively in the measurement of skills and narrow factual knowledge, important as they may be both for their own sakes and as indices of broader learning. In a carefully thought-out paper he calls upon the specialists in measurement to extend their measurements greatly. Educational measurements of the near future, he thinks, may include not only paper and pencil tests but also records of observation of pupils, collection of products of their work, records of their readings and of the dramatic and musical productions attended, etc. Upon the Progressive Educationists also he places responsibilities. First, he thinks that they should formulate in an understandable fashion the objectives which they are trying to realize, and secondly, that they should coöperate with measurement experts in improved analyses of objectives wherever necessary and in the search for valid indicators of these objectives.

¹ This is part of an elaborate eight-year experimental study of the work and accomplishments of the Progressive Schools.

McConn (97, 98) also discusses the importance of a closer liaison between the specialists in measurement and representatives of the progressive school idea. He feels that the exponents of measurement are wrong in claiming that the Progressives do not have any homogeneity of plans, but he also feels that the Progressives should welcome measurement of their results by accurate tests if their claims of achievement are to receive any consideration. He favors the use of many informal examinations and the cumulative recording of personal impressions and all measurable facts of students' background, interests, aptitudes, and achievements. Hopkins and Mendenhall (67), after studying the achievement of the students in the Lincoln experimental school on the Stanford Achievement Test, conclude that a new type of test is needed to measure desirable outcomes not covered by existing standardized tests. They feel that such a test as the Stanford has relatively less validity in the new curriculum than in the old.

The results of the American Historical Association study are presented in a lengthy book by Kelley and Krey (77). Much of the book is taken up with a record of experience of members of the committee and others in the use of various measuring instruments. With the results of the study—a five-year project—Krey, the historian, is more or less disappointed. He says that the measurement experts desired from the "social scientists a statement of ends, aims, and purposes of instruction in terms of objective knowledge, confident that once these objectives were so stated they could be definitely measured. Analysis of the material and aims of the social science instruction, however, indicated that no such simple solution of the problem of objectives was possible." He was discouraged by the length of time and the labor required to construct and standardize the few tests made by the committee, and after they were made he was disappointed with the results obtained from their use. Kelley, who was the specialist in charge of the measurement for the Commission, presents the methods which he used and the results which he was able to obtain. But the fact that he too realizes, on the basis of experience, the long distance which the measurement experts and the experts in objectives and curricula must go, before satisfactory evaluations of the work in the social sciences can be made, is shown by a careful analysis which he makes of the differences in viewpoints of the opponents and the proponents of accuracy in the measurement of educational objectives. Some of the main points of the opponents which he states, and then attempts to answer, are: (a) The opponents show but little awareness of the distinction in function and limitation of different sorts of means of appraisal. (b) They show no awareness of the methods of reliability and validity

in evaluating measuring instruments. (c) They assert that objective measures can be made of only the mechanical aspects of achievement. (d) They recognize no real need for proof of the attainability of any objective as a prerequisite to the acceptance of that objective as a guide to instruction. (e) They fail to recognize that a multiplicity of semi-conflicting objectives should be encouraged and that a corresponding number of "variously directioned" tests is desirable.

When we turn to the question as to what trends measurement is taking to meet more successfully the challenges which the guidance expert, the Progressive Education Association, and the American Historical Association place before it, we find research going along two lines. In the first place, there is some work being done which shows the lack of reality or attainability, under present conditions, of some of the goals being set for whole curricula and for individual courses. Stalnaker's research (133), for example, though going quite a distance in measuring some objectives which have until recently been considered rather intangible, indicates that some of the objectives of instruction listed by specialists in English have no more to do with English than they do with any other course. Yoakum (191) concludes that fewer and clearer aims should be posited in English teaching. In the second place, there are many who, while doubtless agreeing with Stalnaker, Yoakum, and others, about the elusive objectives which are being proposed for instruction, are venturing into new fields and trying new methods in the hope that measures with respectable reliability and validity may be made of some of the more subtle outcomes of instruction in various fields.

Also measurement is being extended with a view of gathering more complete information for individual guidance and adjustment. Wood (186, 187) stresses the need for the extension of measurement to include a complete cumulative record of personality and social development as well as detailed facts about the more formal aspects of educational achievement. Henmon (61) says that the techniques of measurement must be extended and applied more convincingly to problems of the curriculum and teaching methods if educational psychology is to meet its most important challenge. Three studies showing serious attempts to extend measurement are: (1) a study by Noll (104) on the measurement of scientific thinking; (2) a study by Caldwell and Lundeen (19) on unfounded beliefs; and (3) one by Van Tuyl and Eurich (175) on interests of students in various subject matter fields. Other illustrations of the extension of measurement will be found in some of the following sections.

DEVELOPMENT AND USE OF TESTS FOR DIAGNOSIS AND
REMEDIAL TEACHING

(a) *Personality Study and Educational Diagnosis.* Five articles bearing on the relationship between personality and educational diagnosis have come to the attention of the reviewers during the year.

Karlan (75) studied 31 students who had failed in the secondary school and attributes the failure of 21 of these to feelings of inferiority, timidity, emotional instability, or emotional immaturity. Street (147) finds that 15 out of the 107 elementary school children referred to a psychological clinic for failure in school work were failing "because of personality difficulties". Fear reactions in some form were found to be the core of most of the serious maladjustments. Zachry (192) stresses the importance of studies of emotional adjustment and maladjustment in all diagnostic and guidance work in high schools. Kirk (80) studied the relation between remedial reading and personality adjustment in a small group of dull problem children. He found that decided improvement in personality adjustment attended improvement in reading. Damerau (33), on the other hand, working with 22 children with reading disabilities and behavior problems, obtained very different results from those of Kirk. He found that improvement in one field bore little relation to improvement in the other.

It seems to the reviewers that all the above writers are inclined to generalize too broadly from their studies or from the particular type of cases with which they are accustomed to deal. The great dissimilarity in the types of cases studied probably accounts for the large discrepancies in findings of different workers. However, in spite of the discrepancies, these studies point to a fertile field for specialists in educational diagnosis to consider.

(b) *The Study of Diagnostic Techniques.* Betts (8) has developed an electrical recording apparatus for use in the study of errors in oral English. Dewey (37) has employed a radio-microphone-dictaphone arrangement as an aid in the study of reading comprehension of individuals. Burge (18) describes the use of the interview method as an aid in the diagnosis of mathematical difficulties. A part of the interview consists of having the child work problems under the eye of the examiner. Brueckner and Hawkinson (17), in a study of the number and the order of arrangement of items in an algebra test, conclude that at least 4 examples of each type of "function" should be included, and that the grouping of all examples of the same type together is as good an arrangement as any. Traxler (167) has employed free- and controlled-association tests in the study of rate of reading. He concludes that there is some ground for thinking that slow reading rate in the case of many children may be related to slow association rate, and that where this is so teachers

should not utilize the usual methods to get them to read more rapidly. Robinson and McCollom (119) find that in many reading tests it is rate of reading rather than accuracy of comprehension which really distinguishes "good" readers from "poor" readers. This they consider to be a criticism of the tests. Brueckner (16) has devised tests to measure the "computational, informational, sociological, and psychological functions" of arithmetic instruction, and reports inter-correlations among these functions as measured. Goodman (54) has used the Leonard Diagnostic Test in Punctuation and Capitalization in an extensive survey and has analyzed the main results which the test yields. Fenton and Wallace (47) have made a questionnaire study of the tests and other measures employed for diagnostic purposes in 28 child guidance clinics. Studies of eye movements in reading have been made by Tinker (163), Tinker and Frandsen (164) and Futch (49). The first two studies dealt with the reading of English; the third with the reading of Latin. In all cases the measurement of eye movements proved to be a poor diagnostic technique. Tinker says that eye-movement patterns do not cause but merely reflect efficient or poor reading performances, and measurements of them may be dispensed with in diagnostic testing and remedial teaching with no loss.

(c) *Diagnosis and Remedial Teaching.* Segel (122) has prepared a monograph on the educational use of diagnostic results. He stresses the need for the use of the results for individual guidance and for enriching the child's experience in lines in which he is best fitted, and not for the purpose of merely levelling up the child's gifts and deficiencies. Gates and Bennett (52) have conducted an investigation on the cause and correction of reversal tendencies in reading. Their data do not seem to confirm Orton's hypothesis of confusion of cerebral dominance as an explanation in such cases. The writers favor a theory of acquired habits rather than one of brain organization. Suggestions for prevention and correction of this type of reading defect are given.

One extensive monograph and six articles dealing with diagnosis and treatment of miscellaneous defects in reading have appeared: Gray (55), Strang (145), Witty (183), Tinker (162), Deal (36), Gibbs (53), and Robinson (118). The main points emphasized by one or more of these were the importance of accurate diagnosis, the importance of motivation and drill, the need for proper selection of reading materials on the basis of difficulty and interest value, the efficiency within limits of devices for increasing number of words comprehended at a single fixation, and the value of individual instruction almost irrespective of the method employed.

Thorndike (156) has written a series of three articles on the general topic of improving ability to read. In the first article he analyzes the aims of reading instruction and discusses the procedures and methods of accomplishing each of these aims. In the other two articles he considers reading difficulty as partly a function of unsatisfactory textbooks and dictionaries. He says: "There simply are not enough books satisfactory in both content and vocabulary to provide wide reading for pleasure by the lower half of the pupils in grades 4, 5, and 6." Suggestions are given for creating and modifying books to meet the needs of young readers more satisfactorily. Cook, Norvell, and McCall (26) have worked out a series of reading texts and workbooks which represents a distinct forward step in meeting some of the needs which Thorndike mentions. This series incorporates in very effective fashion testing methods as an aid to teaching.

For other contributions which should be mentioned in this section, see (1), (81), and (44).

DEVELOPMENT AND USE OF TESTS FOR PROGNOSIS, CLASSIFICATION, GUIDANCE, AND SELECTION

(a) *General.* Toops (165) outlines the objectives of a state-wide guidance program for secondary schools, and discusses the tests and administrative procedures which he thinks will be required for the success of such a program. Wood and Beers (188) say that educational guidance is seriously hampered by rigid curriculum requirements, and they feel that the full potentialities of the measurement and guidance movements will not be realized until pupils are studied as individuals. McConn (96) thinks that the main improvements in guidance which lie immediately ahead are further refinement and diversification of tests, the simplification of cumulative record forms, better training and greater use of advisors, and the modification of courses of study. Bayliss (6), in a study of failure among college freshmen, concludes that students with high scholastic aptitude as well as those of less ability need guidance.

The general problem of the relation of interest to educational and vocational guidance was taken up in three articles.

Strong (150) finds that the broad interest patterns of high school students do not change much with age and therefore such patterns can be taken quite seriously in guidance work. In another article Strong (149) gives the results of a five-year follow-up study of 223 secondary school students who entered Stanford University and who were finally tested in their senior year of college.

The correlations between initial and final occupational interest scores varied from .59 to .84. Sixty-three per cent of all ratings were identical on the two occasions. Segel (123) and Segel and Brintle (124) studied the relation between scores on the Strong Interest Blank—and certain other tests—and average marks in each of 4 college subjects over 1 year with 100 junior college boys. They find that the Strong interest scores will predict differences between achievement in different school subjects with a fair degree of success. They will predict such differences considerably better than they will predict absolute achievement in single subjects.

Jones (73) has prepared a second and enlarged edition of his comprehensive text-book on guidance.

(b) *Prediction of Success in Higher Education.* Twelve articles dealing with prediction of success at the college level have appeared during the year.

Johnston and Williamson (72) present the results of a four-year follow-up study of several classes at the University of Minnesota. Predictions of success in college were made from a composite index based on students' ranks in high school classes and psychological test scores. Only 4.3% of students falling below a certain low critical score ever graduated from the institution, and 63.9% of those above a certain high score graduated. Stalnaker and Richardson (136) described a scholarship examination for the selection of the most promising students at the University of Chicago. Wagner (177, 178) collected a large number of items of information about students applying for entrance to the University of Buffalo. The best single predictive index was the averages on the New York State Regents Examination. This was better than position in graduating class, standing on the American Council Psychological Test, or the standing on Iowa High School Content Examination. An extensive and valuable collection of statistical data dealing with a variety of problems of prediction is presented in this study. Watson (180), Asher (3), Garrett (50), and Hughes (70), have studied the value of different variables in the prediction of college success. There is not sufficient agreement in their results, however, to justify any general conclusion from them, except the well-known finding that a certain level of intelligence is indispensable for college success. It seems that the conditions in different schools and localities are so different that any predictions based on facts from school records will vary greatly from place to place. Finch and Nemzek (48) in an attempt to predict honor-points in university work find that high school honor-point averages, college aptitude test ratings, and intelligence quotients correlate .77, .42, and .48 with university honor-points respectively. Seay (121) finds that the standardized tests most frequently used for predictive purposes during Freshman Week in the Association of Southern Colleges are psychological and English tests.

(c) *Prediction of Success in Various School Subjects.* Prediction of success in mathematics has been the subject of investigation in 3 studies.

Perry found (110) that rather reliable predictions of honor, normal, and probation-failure students in college mathematics could be made on the basis

of the following battery of tests: Iowa Mathematics Training Test, Iowa Chemistry Aptitude Test, American Council Psychological Test, and a placement test in English. Orleans (107) reviews the literature on prediction of success in algebra and geometry in high school and presents results obtained with 2 new prognostic tests: one in algebra and the other in geometry. He finds that the correlations between scores on the prognostic test in algebra at the beginning of courses in algebra and teachers' marks on achievement in the courses range from .50 to .80 in different classes. The correlations between scores on the geometry prognosis test and teachers' marks range from .42 to .78. The author says that the fact that the coefficients vary so much for different groups during the same semester shows that the teacher element is one of the interfering factors which keeps the correlations down. Ayers (4) has been able to predict success in beginning algebra with a fair degree of success by means of a battery composed of teachers' estimates, a reasoning test, and a prognostic test.

Reusser, Brinegar, and Frank (116) have attempted to predict success in first year college chemistry. The best correlation they were able to get between their prognostic scores and actual achievement as measured by teachers' marks was .57.

The possibilities of predicting success in the mastery of French accent in French courses from pitch discrimination scores on the Seashore Music Test were investigated by Dexter (38) and Dexter and Omwake (39). Correlations averaging .64 were found between the pitch discrimination scores and the accent ratings.

Hevner (63), Stanton (139), and Chevais (24) have made studies of musical aptitude. Hevner's study is concerned primarily with the appreciation of music. She gives a good review of the experimental studies in the field, and describes a scale for aptitude toward music, a test for musical concepts, and a music discrimination test which she has devised. These, like the Seashore tests, are recorded on phonograph discs. Stanton presents facts upon the accuracy of the prediction of student success in a music school. Predictions were made at the time of entrance to the school on the basis of scores on the Seashore tests and certain other measures. On the basis of these predictions these students were marked "safe", "probable", "possible", "doubtful", or they were discouraged from entering. The percentage of students in these groups graduating within 4 years of entrance was 60, 42, 33, 23, and 17, respectively. Chevais has devised a new test of musical aptitude including mainly measures of perception of pitch, intensity, and rhythm.

Walker and Adams (179) have studied the degree to which the Stanford motor skills test will predict typewriting proficiency. All correlations obtained were very low. Farmer (45) investigated the value of school examinations,

intelligence tests, sensori-motor tests, and mechanical aptitude tests in predicting success in a course of training for skilled trades. The highest r obtained from any battery of tests was .36. Baker and Crockett (5) have published revised norms for both boys and girls for the Detroit Mechanical Aptitudes Examinations.

(d) *Measures of Readiness for Entrance to First Grade.* The problem of the optimum time for children to begin first grade has not received the serious study which it deserves. It is encouraging to note, however, that in the last few years the research on this problem has been increasing somewhat. This year 4 studies dealing with the problem have appeared.

Hildreth *et al.* (64) have prepared a new form of the Metropolitan Readiness Test, which is probably the best single test now available in this field. Lee, Clark, and Lee (86) have experimented with a new reading readiness test which they have developed, and find that it predicts success considerably better than do teachers' ratings and somewhat better than 2 intelligence tests. Wolf (185), working with relatively homogeneous groups, finds that the Detroit First-Grade Intelligence Test, given to children at entrance to the first grade, correlates with success in reading 2 semesters later to the extent of only .21 to .30. Bigelow (9) finds that children entering first grade between 6-0 and 6-4 in chronological age are practically certain to succeed if their I.Q.'s (on the Kuhlmann-Anderson Intelligence Test) are 110 or above, and they have "a fair chance of success" if their I.Q.'s are between 100 and 109. Children somewhat under 6 years of age will usually succeed if their I.Q.'s are 120 or above, but their chances of success are small if their I.Q.'s are below 110.

(e) *Use of Tests for Student Classification.* Cheydleur (25) presents evidence upon the success of the use of tests for placement purposes in foreign languages at the University of Wisconsin over a three-year period. Tests of the American Council series and the Coöperative Test Service series were used. Freshmen and transfers from other institutions were placed in classes in accordance with the test results. The per cent of the "placed" students doing satisfactory work in the classes to which they were assigned was very high and the time saved by many students as a result of advanced placements was striking. Proficiency examinations as substitutes for course requirement toward graduation have also been tried with success.

Stevenson (144) reports successful use of placement tests in modern languages at the University of Pittsburgh. Seibert and Goddard (125) describe the use of 2 French tests in the sectioning of students over a three-year period. Combined test results were found to correlate between .66 and .73 with semester marks in French. Taylor (152) reports evidence favoring the sectioning of students in analytical geometry on the basis of marks obtained in previous

work in mathematics in college. Yates (190) and McKee (99) favor the sectioning of students in English on the basis of test results.

DEVELOPMENT AND USE OF TESTS FOR SURVEY AND EXPERIMENTAL PURPOSES

(a) *Survey Testing.* The Committee on Educational Testing of the American Council on Education (2) reports the results of the 1934 college sophomore testing program. One hundred thirty-seven colleges in 37 states participated. Percentile results based on 5,000 to 6,000 students are given separately for about 10 tests. A low negative correlation was found between chronological age and achievement. Women students on the average exceeded the men slightly in English. The men exceeded the women slightly in contemporary affairs and exceeded them by nearly 2 S.D.'s in general science and general mathematics. Brolyer (14) presents the results attained in 1934 on the scholastic aptitude test of the College Entrance Board. The scores of 8,707 students are presented and analyzed.

(b) *Development of New Tests and Evaluation of Older Tests.* Tyler (171) has prepared a very stimulating monograph on methods of constructing achievement tests. He gives particular attention to the problems of extending measurement to include more of the objectives of instruction in various courses in which measurement is attempted.

Tiegs and Clark (161) have constructed a new achievement test series in the fundamental skills of reading, mathematics and language. There are 4 separate batteries each suitable for a different grade range. Stalnaker (132, 134, 135) describes the development of tests in English composition at the University of Chicago. Much use is made of essay writing which Stalnaker finds can be scored with "very high reliability". Rinsland and Beck (117) have developed a test in English usage. Williams (182) has constructed a new spelling scale. Greene (57) has developed a speed of reading test for use over a wide range of grades. It is based on material of fourth grade difficulty. Traxler (168) has prepared a new test in silent reading suitable for grades 7 and 12. Courtis (28) has developed a new set of tests in arithmetic. Remmers (114), Davis (34), Starrak (140) and Seyfert and Tyndal (126) have investigated several different methods of measuring teaching efficiency.

Smith (129) has made a comparative study of 6 standardized civics tests at the high school level. The Brown-Woody Civics Test and the Magruder-Clinton-Chambers Test in American Government were found to be the best, at least from the point of view of reliability. Diamond (40) reviews the achievement tests in high school biology. Weller and Broom (181) have made an investigation of the validity of 6 types of spelling tests. They conclude that the dictation type is more valid than any other.

(c) *Relation of Various Factors to Educational Achievement as Revealed by Tests in Surveys and Experiments.* Extensive use is being made of educational tests to determine the influence of various factors upon achievement. Space will not permit even a brief mention of the results obtained in such studies, but the more significant of them will at least be mentioned by author and topic.

Caldwell and Mowry (20), Garth and Johnson (51), and Witty and Jenkins (184) have studied the influence of race upon achievement. Lane and Witty (85) have studied the relation of delinquency, and the personality maladjustment going with it, to school achievement. The effect of college fraternities on scholarship has been studied by Carter (21). A comparison between achievement in "reorganized" and traditionally organized schools was made by Beatley (7). The effect of home study upon achievement in the seventh grade has been investigated by Steiner (141). The influence of the summer vacation upon maintenance of achievement was studied by Kolberg (83). An experimental study of the effect of the use of the typewriter in beginning reading has been made by Unzicker (173).

PROBLEMS AND TECHNIQUES OF TEST CONSTRUCTION

(a) *Reliability and Validity.* Investigations of the problems of reliability and validity have been somewhat active.

Lorge (90) repeats a battery of tests after a ten-year interval and finds that time diminishes the predictive value of tests. In using tests for guidance, therefore, he maintains that the re-test reliability over time intervals must be considered. Copeland (27) reports that reliability coefficients on a certain achievement test dropped very noticeably during an interval when thorough learning took place. Stephenson (143) in a very challenging article proposes that in reporting facts about tests it should become the practice to give not only the reliability, but also the factor saturations of the tests. Dickey (41) proposes a new formula for estimating the reliability of a test for one range when the reliability coefficient is known for another. Smith (130) makes an empirical study of the relation between item validity and test validity. By making up a series of sub-tests from items of different levels of validity he finds that, whereas a sub-test composed of the least valid of the items was least valid, the sub-test composed of the most valid of the items was not necessarily the most valid. He concludes that the very slight improvement obtained through the use of item validity coefficients would ordinarily not justify the labor required to compute them. Handy and Lentz (59) have studied the relation of the differentiating value of items to test reliability. A general discussion of validity has been written by Turney (170).

(b) *Analysis and Scoring of Test Items.* There have been 5 studies dealing with the problems of analysis and scoring.

Henry (62) reports that the difficulty of a test item, if it is not one passed by almost all children or failed by almost all, has little relation to its validity.

Long (89) describes the overlapping method of determining validity of test items. Zubin (193) reviews critically 3 methods for internal validation of items of a test, *i.e.*, the critical ratio, the bi-serial, and the association methods. Horst (69) gives the mathematical derivation of a proposed method of test item analysis which takes into account the intercorrelations among the items. Votaw (176) writes a note on the validation of test items of the true-false type by comparing responses of widely spaced groups.

(c) *Test Norms.* Two articles have appeared on the general topic of test norms.

Crawford (31) investigated the effect of age and progress factors on the achievement test norms of 7,668 sixth grade children. He concludes that norms based on groups in which the factors of chronological age, mental age, and rate of progress are uncontrolled are of questionable value. Curtis (29) contends that more attention should be given to individual patterns of growth in the determination and interpretation of norms in the case of individuals.

(d) *Factor Analysis and Its Relation to Test Construction.* The relation of factor analysis to test construction is an important problem but one which does not come particularly within the confines of this summary because the methods of factor analysis are being applied to all fields of measurement. Three articles on this topic, however, are sufficiently close to the problem of educational tests to deserve mention.

Thurstone (160) has devised a multiple-factor method of analysis and has applied it in an exploratory fashion to several areas of the field of measurement. He suggests that an adequate multiple-factor analysis of mental abilities will probably yield at least 3 distinct, though correlated, factors, *vis.*, verbal ability, perceptual relations, and mathematical ability. Thorndike (158) in a discussion of unity of traits and its bearing upon test construction discusses among other things the work in factor analysis. While he speaks appreciatively of factor analysis and grants that it may possibly be the most profitable line of attack for identifying the "factors" or "components" which it is most worthwhile to try to measure, he has some misgivings about it. "The expectation from actual measurement", he says, "is that the web of life is not constructed from a score or so of large unitary stripes in warp and woof plus some thousands of very minor threads and adventitious tags and fragments. The safe procedure is not to assume what the total score of a group of tests or items measures but to observe their intercorrelations."

Line, Rogers, and Kaplan (88) have applied the Spearman and Thurstone methods of factor analysis to academic records.

TEACHERS' CLASSROOM TESTS

(a) *Short-Answer Tests.* Several studies were made during the year on the influence of short-answer tests upon student's method of study in preparing for them. Meyer (101) in a carefully devised

experiment divided 124 college students into 4 equated groups and had each study a set of new material for 3 two-hour periods. One group was directed to study for a true-false test, another for a multiple-choice test, another for completion, and another for essay-type test. At the end of the study period he investigated the methods of study employed and the efficiency of learning and retention. Important differences in methods of study were found. The problem of the efficiency of learning and retention was studied by having all groups, regardless of initial instructions, take the same examination consisting of questions of the 4 types immediately following the learning and again after a five-week interval. The most significant differences among the groups were found on the tests given after the interval. The results are much more favorable to the essay and completion types than to the other 2, many of the differences being statistically reliable. Terry (154) and Douglass and Tallmadge (42) obtain results which, like those of Meyer, definitely indicate that the methods of study employed by students in preparing for a test are influenced by the type of test which they expect.

The suggestion effect of the true-false test has been studied by Sproule (131), and McClusky (95). The former finds the negative suggestion effect to be very slight; the latter finds it to be quite appreciable. Another study bearing somewhat upon this problem is that by Keys (79) on the influence of true-false items upon specific learning. Sims (127) has made a study of the rearrangement test, giving special attention to methods of scoring and to the relative efficiency of short and long series. Chapman (22) has given an excellent mathematical analysis of the chance factor in the matching test.

A summary of the investigations dealing with the short-answer tests during the years 1931-1933 has been prepared by Lee and Symonds (87).

(b) *Traditional or Essay-Type Tests.* Stalnaker and Stalnaker (138) present evidence to show that the essay-type test can be scored with rather high reliability if certain rules are followed in formulating questions and in scoring. Brigham (13) has made an analysis of the procedures used by readers of the English examinations of the College Entrance Examination Board, and believes that the major sources of errors in marking have been identified. A new method of grading is being tried which, he thinks, will lead to greatly increased reliability. Osburn (108) shows that the use of a key in scoring improves reliability, although not sufficiently to eliminate wide differences among scorers.

Oral examinations have been studied by Trimble (169). He finds them to be low in reliability and validity as ordinarily given at present, but he believes that they may be greatly improved.

For other studies dealing with teachers' informal tests, see: (46), (58), (94), (137), (151).

TEXTBOOKS, SUMMARIES, REVIEWS, AND BIBLIOGRAPHIES

General textbooks have been prepared by Strang (146), Reusser (115), Chên (23), and Pieter (111).

Eight summaries and reviews have appeared, each containing an extensive bibliography. These will be listed by topics.

General: Jones and Brown (74); Stenquist and Broening (142). *Statistics and Theory of Test Construction*: Holzinger and Swineword (66) (annotated bibliography only). *Short Answer or Objective Tests*: Lee and Symonds (87). *Measurement and Prediction of Teaching Ability*: Torgerson (166). *Research in Reading*: Gray (56). *Research in English*: Smith (128); Jewett (71).

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CHARACTER AND PERSONALITY TESTS

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The growing interest in personality measurement is revealed in the increasing number of publications in this field. The present review includes tests and studies which have appeared during the year 1934.¹

I. SUMMARIES AND REVIEWS

(A) *Comprehensive Treatises*. Symonds (204, 205) presents a comprehensive classification and description of tests, questionnaires, and rating scales in the field of personality. He also deals with the diagnosis of delinquent tendencies, vocational fitness and leadership, and problems of mental hygiene. Strang (200) includes a comprehensive bibliography of tests and studies in educational guidance in high school and college. The use of tests in the social sciences and the results of some character tests and ratings are presented by Kelley and Krey (100). The book includes also an account of a study of honesty by Jordan.

(B) *Bibliographical Reviews*. A thorough review of measures of introversion-extroversion is presented by Guilford (67). The 115 titles include tests, theories, descriptions, rating scales, types, physiological indices, and practical applications. Droba (47) presents a similar topical review of measures of social attitudes, with a bibliography of 104 titles. A review of various techniques and methods of time sampling is given by Olson and Cunningham (152), and Campbell (29) reviews the studies on the characteristics of only children.

Maller (126) presents a review of character and personality tests published in the year 1933. The bibliography of 269 titles and the review include tests and testing techniques as well as objective studies in character and personality.

(C) *General Summaries*. May (135) summarizes the various approaches to personality measurement such as records, reputation,

¹ The writer wishes to acknowledge his thanks to Dr. Otis W. Caldwell and Dr. Rudolf Pintner for many valuable suggestions.

observation, interview, psychological tests and experiments. A general summary of measures of interest and personality tests is given by Keys (103). The use of tests for forecasting educational and vocational success is discussed briefly. Fauville (52) presents an account of research, both methods and results, relevant to the organization and components of personality and the relation to physical traits, temperament, and character.

(D) *Critical Discussions.* Hendrickson (80) discusses the assumptions underlying personality measurement. He considers the nature and stability of personality as well as the social factors involved. Terman (207) maintains that at present we are not measuring personality but responses which reveal certain aspects of personality. Further analysis should be made of the significance of the variation in responses to specific items as well as total test.

Hamilton (71), discussing personality measurement from the psychoanalytical point of view, suggests that while personality is not directly measurable, it becomes so indirectly through its component dynamisms which are expressed in behavior. MacFarlane (124) cites several reasons for the limited value of personality measurement from the psychiatric standpoint. The clinician is primarily concerned with the individual and his problems rather than with general characteristics.

The inadequacy of abstract questions for the understanding of character is emphasized by Koga and Kato (108), and the distinction between character and personality is pointed out by Smith (187) in a discussion of issues in personality measurement. The criteria of character are chiefly in behavior, while the criteria of personality are emotional and ideational states. The purpose of personality measurement is to predict the probable nature of a person's behavior in a certain situation.

II. SELF-DESCRIPTION TESTS

A number of new tests have been devised, and several adaptations of older tests have been added. Some of the new tests are composed of a number of sub-tests, yielding several scores. The *Pupil Portraits* by Pintner, Maller, Forlano and Axelrod (161) includes 5 sections on adjustment at home, at school, etc. Two equivalent forms are available and the items are impersonal descriptions rather than direct questions. An adjustment inventory has been devised by Bell (10), which includes items on home, health, social, and emotional adjustment. The announcement regarding Bell's inventory presents rather

dubious claims that "the measurement of home adjustment is the first of its kind", that it is "designed primarily as a clinical tool rather than as a research instrument", and that "no special training is necessary to administer or score the inventory or to interpret the results".

The inventory of Humm and Wadsworth (89) called the Temperament Scale, is based on Rosanoff's theory of personality. The scores are analyzed into five categories: normal, hysteroid, cycloid, schizoid, and epileptoid. The items in Ingle's inventory (92), which is called a test of mental instability, were selected in accordance with several criteria. Maller (129) devised an inventory which is to be used as an individual test. It is called Personality Sketches and consists of 96 cards which the subject is to use for self-description. Inventories of items dealing with introversion and extroversion were constructed by Guilford (67) and by Stagner and Pessin (193). Page (154, 156) compiled a questionnaire of 50 items typical of schizophrenic behavior.

Other inventories were devised by the following: Guilford (68); Seham and Schey (181), whose questionnaire of efficiency includes 84 items of maladjustment to be used in an interview; Payne (160) who has added one more to his previous self-description inventories; Brown (24) who adapted an inventory for children between 9 and 14 years of age; and Thompson (209) in whose inventory the items are given in the form of continuous scales extending from one extreme to the other.

Adaptations of older tests include a modification of the Character Sketches in a study by Maller and Lundeen (130) of the relation between maladjustment and superstition, the White House Conference personality scale (35), and an adaptation in French of the Woodworth Mathews questionnaire (83). Papurt's revision of the Woodworth inventory was found by Uehling (210) to be less satisfactory than the original. Willoughby (218) reports norms for the Clark revision of Thurstone's inventory. Stevens and Wonderlic (198) describe the results with Beckman's adaptation of Allport's ascendance-submission test which they found less satisfactory than the original. Hurlock and Klein (90) devised a questionnaire for the study of heterosexual and homosexual attachments among adolescents, and Hartmann (76) studied the relationship between expression of happiness and neurotic tendencies.

(A) *Application of Tests.* Woodworth's questionnaire was given by Stagner and Feinberg (192) and the results were correlated with Cason's Annoyance Test; and by Wrightstone (221) who presents evidence of its validity. Thurstone's Personality Schedule was applied by Lyon (123) in a study of deaf children, finding them to be considerably maladjusted, and by Simpson (184) in a study of prisoners, who were found to have a significantly higher score of maladjustment. Maller's Character Sketches were employed by Wrightstone (220) in a comparison between traditional and progressive schools, and by Van Wagenen (212) in a comprehensive study of the effect of variation in the conditions under which an inventory is administered.

The introversion tests of Heidebreder and that of Neyman and Kohlstedt were given by Page (154) to psychotic patients and normal individuals. He found that the scores of different psychotic groups were nearer to one another than to normal groups. Patrick and Sims (159) found differences between white and Negro college students on tests of introversion and neuroticism. Cavan (35) reports on the use of the Murray psychoneurotic inventory and compares the results with those of the White House Conference inventory.

Bernreuter's inventory was used by Darley and Ingle (41), Engle (51), Hoffeditz (86), Johnson (97), Landis and Katz (113), Laslett and Bennett (114), Omwake (153), Stagner (191), and Yu (224).

Discussions of the validity of self-description tests are presented by Robertag (168), who questions the value of character self-analysis, and Rosenzweig (173), who offers suggestions for increasing the validity of verbal personality tests by differentiating between the person's estimate of what he is and what he wants to be. Hoffeditz (86) reports low but positive correlations among the scores of members of the same family.

The relation between scores on psychoneurotic inventories and other measures of personality have been investigated by Hanna (73), who correlated the scores with clinical diagnosis; Stagner (191) who correlated them with results of interviews; Fisher and Marrow (55), and Johnson (97) who compared the scores on inventories given to subjects in elated and depressed moods.

Low intercorrelations among different tests of introversion were found by Gilliland (63), who ascribes the discrepancies to differences among the tests in regard to contents and methods of scoring. Vernon (213) discusses the problem of the subject's attitude in personality testing, and maintains that the true purpose of a personality test should not be revealed to the subject.

(B) *The Bernreuter Inventory.* Because of the popularity of this inventory it is interesting to review some of the findings of those who have experimented with it. According to Kuznets (112), "the high validity coefficients obtained by Bernreuter are to a large degree spurious" because the correlations between the inventory and other tests are due to the large number of items taken from those tests; 50 items of the inventory came from Thurstone's Schedule and 31 from Allport's A-S study.

Darley and Ingle (41) administered the Inventory to employed and unemployed workers. They found it ineffective in identifying those individuals who had been previously diagnosed as psychotic cases. Landis and Katz (113), who gave Bernreuter's and Thurstone's inventories to psychiatric patients, concluded that "the scores on the tests are not adequate measures of neurotic tendency, so far as psychiatric patients are concerned". Laslett and Bennett (114) correlated the scores on Bernreuter's Inventory with scores on the Kent-Rosanoff clinical test of free association, and found no relationship between the two. They concluded that "the two tests do not measure the same thing or they do

not measure it in the same way". Yu (224) reports that the difference between manic-depressive and dementia praecox cases on the Inventory was too slight "to warrant its use as a diagnostic tool". Omwake *et al.* (153) found no relationship between the scores on the Inventory and physiological tests of metabolism, blood pressure, etc.

Bernreuter himself (11) reports that the correlation between the neurotic tendency score and the introversion score was about as high as the average correlation among different tests of introversion. This seems to be convincing evidence that the two scales measure one variable, not two. There is thus little justification for the claim that the Inventory is "a device for the measurement at one time of four personality traits having the immediate advantage of saving in cost and in the time required for administration . . ." and that "the four scales give highly reliable measures of the following traits: neurotic tendency; self-sufficiency; introversion-extroversion; and dominance-submission. . . ." This claim of a four-in-one measure, which is the least justified feature of the inventory, has been largely responsible for its popularity. According to the circular "approximately 100,000 copies of the Personality Inventory were used last year".²

III. INDIRECT MEASURES OF PERSONALITY ADJUSTMENT

(A) *The Rorschach Test.* Six studies have been concerned with the Rorschach Test.

The Rorschach method and its relation to personality organization is discussed by Beck (8). Personality is considered a product of 5 forces: form perception, organizing energy, creativity, affectivity, and environment. Levy and Beck (119) present the results of the Rorschach Test given to manic-depressive patients. Hertz (82), who administered the test to 100 high school students, reports a reliability coefficient of .89. Kerr (102), applying the test to normal and defective children, finds a high degree of correspondence between test results and clinical case histories. He concludes that the test is a valid instrument for measuring emotional instability. Similar evidence of the validity of the ink-blot test is given by Giehm (62) who found it useful for clinical diagnosis. Meltzer (142) gave the test to 64 stutterers and compared his results with those of Rorschach in regard to contents, quality, and originality of responses.

(B) *Other Tests.* The lack of reliability and validity of Downey's Will Temperament Test is demonstrated by Kennedy (101). The

² The Stanford University Press has just announced the publication of "two new scoring scales for use with the Bernreuter Inventory" for the measurement of *self-confidence* and *sociability*.

correlation between test and retest a year later was found to be only .12, and the correlations among the test items were insignificant.

The free association word list of Kent-Rosanoff was used by Laslett and Bennett (114) and the responses were found to show little correlation with the scores on a psychoneurotic inventory. Stagner and Feinberg (192) administered the Pressey X-O Test and correlated the results with scores on self-description tests.

A disguised test of emotional balance was devised by Maller (127). It is called Controlled Association Test, and each of the 2 equivalent forms consists of 200 items. The test yields 3 scores: eccentricity, emotionality, and superstitiousness. The total score of irrationality was found to differentiate between normal adults and psychiatric patients.

IV. MEASURES OF ATTITUDES AND INTERESTS

A scale of attitude toward disarmament was devised by Cherrington (37) in accordance with Thurstone's technique. Each of the 23 statements has a scale value. Droba (46) studied the war attitudes of college students and found that students with no political affiliations were most truculent while those of Republican affiliation were not in favor of war. Thurstone's scale of attitude toward war was given by Sowards (188) to college students. He found that college education brings about some increase in pacifist attitude. A series of attitude scales have been prepared under the direction of Remmers (165). These include attitudes toward defined groups, occupations, vocations, school subjects, and home making activities and practices.

An opinionnaire of 120 items bearing upon home, school, state, industry, religion, and ethics was devised by Smith (187), who compared the scores of high school students with those of parents and teachers. A similar opinionnaire was devised by Lentz (117) to measure conservatism with regard to social, political, economic, religious, and racial questions.

Attitudes toward racial groups were measured by Johnson (96) who studied the attitudes of several thousand college students toward the Negro, and by Beckham (9) who studied the race attitudes of delinquent and normal Negro children and adults. Among normal Negro children the race prejudice which they experienced was a motive for working harder while among the delinquents the humiliation resulted in antagonism. Wegrocki (215) measured attitude by means of a scale of 9 steps ranging from liking to hating. The list included racial and national groups, individuals, political parties, and religious and economic positions. A brief scale of attitudes toward other people is described by Zeligs (225). The children are asked whether they would like to have those of other groups as neighbors, classmates, and playmates.

Carlson (32) administered a number of Thurstone's attitude scales to college students. Differences were found among members of different religious affiliations. The various scales were found correlated, suggesting three factors: intelligence, radicalism, and religiosity. The relation between religious belief and attitudes was studied by Zimmerman (226). Radical attitude was found negatively correlated with religious belief. Hall (70) studied the attitudes of employed and unemployed engineers toward employer, religion, and occupational morale, and found striking differences between the 2 groups.

(A) *Personal Attitudes and Beliefs.* Clem and Smith (38) studied the attitude of high school students regarding such personal habits as drinking, gambling, swearing, and card playing, and the attitudes toward such phases of character as cheating, selfishness, conceit, vulgarity, etc. The attitudes toward undesirable personal habits were found to become more tolerant with age, while the attitudes toward defects of character become less tolerant with age. Franzblau (60) investigated the relation between some religious beliefs and certain aspects of character among Jewish adolescents. The acceptance of traditional beliefs was not found correlated with superior character. Dudycha (48) found that the belief in evolution increased from the freshman to the senior year.

Biological attitudes and appreciation were studied by Gray (66) in a series of 14 types of items. Four questionnaires dealing with attitudes toward slander and freedom of speech were prepared by Yates (223) and given to 1,000 children. Comparisons were made between the children's opinions and the legal point of view. Bain (5) studied the attitudes of teachers toward behavior problems by means of Wickman's scale.

Other tools for measuring attitudes include a scale for measuring attitude toward the question of children's freedom by Koch *et al.* (107), a scale of attitude toward nursery schools by Cunningham (40), and a scale of attitude toward parental behavior by Stogdill (199). The latter scale was given to parents and to child guidance specialists. Mathews (134) studied the attitudes of children whose mothers have out-of-home employment.

(B) *Interest and Values.* Strong (202) reports a sex difference with regard to interest. The difference, however, is not as large as that between young and old people or between engineers and insurance men. Rock (169) reports on the constancy of responses to the items on interest blanks.

A scale for measuring developmental age in girls was devised by Sullivan (203). It includes questions regarding interest in things, reading, and choice of vocation. Hoppock (88) experimented with a questionnaire for gauging job satisfaction, and Uhrbrock (211) investigated the attitudes of employees toward their employer and work. Krout (109) studied the relationship between personality types and certain expressed wishes.

Sex differences in the scores on Allport's-Vernon's scale of values are reported by Hartmann (77), who finds men to favor political, theoretical, and economic values and women to favor aesthetic, religious, and social values. Moore and Steele (145) suggest that the study of values is preferable to the personality inventory approach, and Harris (74) reports group differences in values among college students and professors. Arts men scored higher than the others on theoretical and aesthetic and lower on political values.

(C) *Changes in Attitude.* The change in attitudes of college students is studied by Boldt and Stroud (15), who find that college education exerts a liberalizing influence.

That certain attitudes may be changed more readily than others was found by Lichtenstein (120). Rosenthal (172) investigated the effectiveness of radical motion picture propaganda in bringing about changes in attitude, and Wegrocki (215) experimented with the effect of suggestion on emotional attitude. Changes in the religious attitudes of Mexican emigrants are described by Muntsch (148), and the personality changes among Negroes due to changed cultural conditions are analyzed by Johnson (95).

(D) *The Technique of Constructing Attitude Scales.* The studies in attitudes edited by Remmers (165, 166) include comprehensive analyses of the construction and validation of generalized attitude scales. A critical analysis of the war attitude scale of Peterson-Thurstone is presented by Miller (143), and a simplified and more reliable method of scoring Thurstone's attitude scales is suggested by Likert, Roslow, and Murphy (121).

The reliability of responses to questionnaires on social attitudes is analyzed by Neprash (149) who finds such instruments quite reliable. Lentz (117) evaluates the reliability of opinionnaire techniques. Retests reveal that some items and the scores of some persons are more reliable than others. The validity of judgment tests is examined by Brotemarkle and Fernberger (23).

A factor analysis of generalized attitudes is presented by Whisler (216), who finds 6 factors common to 63 attitude items by means of Thurstone's multiple factor technique. The tetrad criterion analysis is applied to 5 measures of international attitudes by Kulp and Davidson (110), who find that those tests have one common factor.

V. APTITUDE, APPRECIATION AND BACKGROUND

Stanton (194, 195) describes a technique for guidance of prospective students of music and the prognosis of musical achievement. Carroll (33) found a marked correlation between appreciation of poetry and abstract intelligence, and Seeman (179) discusses the development of pictorial aptitude in children. A test in aesthetic sensibility is devised by Bulley (27). It is based on the choice between objects differing in aesthetic value.

Tests of safety are described by Stack (189, 190). Seham and Schey (181) devised a questionnaire on health habits, and Noll (150) devised a test of scientific thinking and judgment. A measure of bilingual background was devised by Hoffman (87). He reports correlations between bilingualism and age, reading ability and intelligence. Jewish and Italian groups were studied.

Watson (214) prepared a questionnaire concerning discipline at home and found that strict discipline was correlated with personal and social maladjustment. Similar studies of the relation between home background and personality adjustment are reported by Cavan (36) and Campbell (30). The parent-child relationship of psychotic patients was studied by Witmer *et al.* (219) who found that most of the patients grew up under irritating home conditions.

The effect of poor home conditions and parental attitude upon the formation of withdrawing habits among children is examined by Ridenour (167), and by Francis and Fillmore (59). The latter concluded that economic and social conditions are of greater significance than the physical environment. The effect of social environment upon moral development is discussed by Harrower (75).

The factor of vocational instability among prisoners is studied by Simpson (185). Segel (180) reports on the construction of instruments for the prognosis of fitness in a given vocation. An analysis of the relation between intellectual and temperamental qualities and educational attainment is presented by Russell (175).

Shartle (183) examined the childhood histories of workers and compared them with those of foremen, finding that the foremen had been more sociable than the workers during childhood. The value of interviews, observations, and ratings for vocational guidance is discussed by Rodger (170). Observations of factory workers with a view of classifying them on the basis of temperament and character was made by Okabe (151).

VI. TESTING TECHNIQUES INVOLVING BEHAVIOR

Schulz (178) experimented with a situation in which children were given an opportunity to lie. The motives of lying were studied. Honesty tests were also given by Hill (85) to delinquents and normal high school boys. The former cheated more than the latter. Sex offenders cheated more than those committed for stealing.

Wrightstone (220) administered Maller's Self-Marking Test to pupils in a progressive high school and to those enrolled in a traditional type of school.

The latter were found to cheat significantly more than the former. This test was also used by Franzblau (60) in a study of adolescents.

Rogers (171) administered tests of perseveration to subnormal children. The scores were correlated with measures of speed, will-temperament, self-description tests, types, and background. Crutcher (39) devised 6 situation tests of persistence. These involved manual dexterity, mechanical and artistic skill, facility with numbers, and routine activity. Bestor (12) studied attention of young children and the relation between attention and perseveration. No correlation was found between auditory and visual attention.

Suggestions for measuring recklessness are offered by Burr and Frey (28). A technique for measuring the amount of organization in social groups is devised by Moreno (146). Partridge (157) has devised methods for measuring leadership within a group, and the effect of the leader's opinion upon the attitudes of the group. Brenner (20) studied the effect of incentives and the relation between attitude toward work and the amount of work done. An analysis of boredom in monotonous work is presented by Fenichel (53).

Batteries of Tests. Babcock (4) describes the method of personality tests and analysis of Hoopingarner with regard to 12 personality "traits": impressiveness, initiative, thoroughness, observation, concentration, constructive imagination, decision, adaptability, leadership, organizing ability, expression, and knowledge.

Jones (98) reports on a battery of tests employed in the study of the personality of adolescents. These include measures of interest, attitudes, self-description inventories, extensive observations in and out of school, personality ratings, and a number of measures of physical growth and functioning.

VII. RATING SCALES

Maller (125) devised a simplified rating scale of 50 aspects of character and personality. On each item the rating is in 3 steps: inferior, average, and superior. A personality rating scale for children including 85 items is described by Hicks (84). Fenlason and Leahy (54) devised a scale for the evaluation of personality traits of social case workers. Scales on which students may rate their instructors are described by Brandenburg and Remmers (19) and Starrak (196). The latter includes 11 essentials of teaching and 6 personality traits. Flemming (56, 57) has done extensive work with ratings on various aspects of personality. He found marked correlations between artistic ability and various personality ratings. Hayes (79) devised a scale for evaluating adolescent personality. It includes 100 items arranged in 8 groups.

Marston's personality scale was used in a study of subnormal children by Goldstein (64). No relation between age and introver-

sion was found. Laycock (115) studied teachers' ratings of children's offenses and found that teachers consider violations of authority and school regulations as more serious than other undesirable personality characteristics. A similar study was made by McClenathan (136) on the ratings of children's offenses by teachers and parents. Cattell (34) studied the ratings of students by their classmates on various aspects of temperament and character. Ratings on introversion were found by Shacter (182) to be highly correlated with sustained attention.

Technical Analysis of Rating Scales. Remmers (164) examined the reliability and the halo effect in students' judgments of their teachers, and found a more marked halo effect among ratings of college students than among those of high school students. Betts (13) suggests some fundamental principles to be applied in the construction of a rating system for character emphasis in education. A revised rating technique is described by Stevens and Wonderlic (197). The reliability, validity, and the application of the Vineland Score Card are described by McIntire and Emerson (139).

VIII. OBSERVATIONS

Manwell and Mengert (132) devised an observation blank which includes 27 items of behavior of young children. Bott (16) made observations of the play activities of pre-school children to study their personality development. Suggestions for measuring emotionality in infants are made by Bridges (21).

Observations of specific behavior of young children were made by Brackett (18) who studied their emotional behavior as revealed in laughing and crying; and by Dawe (43) who examined and analyzed 200 quarrels of nursery school children. Jack (93) found that non-ascending children became more ascending after a period of special training. Groups of nursery school children were observed by Dillon (45) with particular reference to the children's attitudes to their own bodies during the period of dressing. The children showed no feeling of impropriety in appearing undressed. Careful observations and ratings of the behavior of junior high school students were studied by Hurlock and McDonald (91).

IX. PHYSICAL INDICES OF CHARACTER AND PERSONALITY

(A) *Physiological Characteristics.* Omwake *et al.* (153) studied the relationship between personality tests and metabolism, blood pressure, and temperature. Patrick (158) studied the effect of various

stimuli on the basal metabolic rate, blood pressure and galvanic reflex. Eames (49) compared good and poor readers in regard to the anomalies in lateral dominance and found no difference between the groups. Bronstein and Brown (22) examined the effect of hypothyroidism upon personality and the remarkable effects of persistent treatment with thyroid extracts.

(B) *Structural Characteristics.* Schneider (177) presents a comprehensive treatment of the physical basis of psychopathic personalities and Barglowski (6) finds that pyknics mature earlier than leptosomes and athletics. Smalldon (186) reports that manic-depressive psychosis is more prevalent among pyknics.

The constitutional differences between homosexuals and normal people are described by Henry (81) who concludes that homosexuality is as much a product of congenital as of environmental influences. Mandolini (131) discusses the constitutional and temperamental characteristics of such men of genius as Beethoven, Kant, Schiller, Chopin, etc.

Flemming (58) correlated a number of personality ratings with morphological indices and skin resistance, and found that low height-weight ratios seem to be associated with social success and high resistance with intellectual interest.

(C) *Functional Characteristics.* The relation between personality and voice was studied by Allport and Cantril (3), who found a very small percentage of correct judgment of physical and psychological characteristics on the basis of voice. The actual voice gave better results than the radio voice. In a somewhat similar study, Taylor (206) found that there was considerable agreement among 20 auditors as to the characteristics of the persons whose voices they heard. Platt (162) maintains that musical sounds of infants are expressive of temperament and disposition. Moore (144) found more cases of speech defects among problem boys than among normal boys. Strehle (201) maintains that gestures are expressive of disposition and urges their study for character analysis.

X. EXPRESSIVE MOVEMENTS AND WORK PATTERNS AS INDICES OF CHARACTER AND PERSONALITY

Harvey (78) found some correlation between the results of personality tests and careful examinations of handwriting. The latter study is reviewed by Meloun (141), who points out certain graphological and statistical principles which must be considered. The methods and application of graphology to the study of personality

is discussed by Reh binder (163) and the relationship between dominant interests and handwriting is investigated by Cantril and Rand (31). Other aspects of expressive movement include studies of the significance of gestures (201), speech (206), voice (3), and appearance (176).

The possibilities of obtaining personality measures as a by-product of intelligence testing have been investigated by Jastak (94). He devised a method for scoring the discrepancy between verbal and performance elements of mental tests, and Davis (42) studied the relationship between personality and "scatter" on the Stanford-Binet. Fredriksen and Guilford (61) examined the relationship between the rate of fluctuation of the outline cube and scores on introversion tests. Bogardus (14) analyzes the relationship between avocation and personality.

XI. ANALYSIS OF THE STRUCTURE AND DEVELOPMENT OF PERSONALITY

Edwards (50) discusses the concepts of normality from the theoretical, clinical, and statistical standpoints. Wile *et al.* (217) studied the continuity of the neurotic process, based on the case histories of 100 neurotic cases from early childhood to late adolescence. Brown (25) discusses emotional maladjustment and its relation to anti-social behavior. Lehman and Witty (116) criticize the reference to personality traits, comparing the latter to the old concept of faculties. Mead (140) discusses the use of primitive material in the study of personality.

Mason (133) studied 4 pairs of twins which were examined in kindergarten and re-examined in junior high school. Personality ratings by parents were also obtained. The intercorrelations among tests given to siblings are presented by Koch and Stroud (105).

Statistical Analysis. The intercorrelations among the various behavior tests of the Character Education Inquiry are analyzed by Maller (128) in terms of general and specific factors. The existence of a general factor of character common to the behavior tests is demonstrated. An analysis of the factors in a test of introversion is presented by Guilford (69), and a similar factor analysis of ratings is made by Koch (106). Zubin (227, 228) discusses the method of internal consistency frequently applied in the construction of inventories and the problem of response patterns. Allport (2) discusses the J-curve hypothesis of conforming behavior, and the relation

between item value and test reliability is discussed by Handy and Lentz (72).

Characterological analyses are presented by Thibou (208), who describes the system of Klages and Prinzhorn. Lersch (118) maintains that ordinary (German) vocabulary is more descriptive of certain aspects of character than scientific terminology. Künkel (111) discusses characterology with reference to the present crisis in Germany. Types of character are discussed by Dessoir (44) who considers 3 types: the vegetative, the easy going, and the striving.

XII. CLINICAL DIAGNOSIS AND TREATMENT OF PERSONALITY PROBLEMS

Rosenzweig (174) analyzes 3 types of reaction to frustration: extrapunitive, intropunitive, and impunitive. The improvement in personality adjustment due to remedial work in reading is described by Kirk (104). McFie (138) studied the incidence of personality difficulties and behavior disorders among school children. Kanner (99) and Lowrey (122) discuss the treatment of personality difficulties, with emphasis on a thorough study of the total personality. A general description of common personality disturbances and methods of treatment is given by Morgan (147). Beck (7) found that indulgence in school work may lead to maladjustment. A technique for guidance through self-measurement, utilizing personality tests, is described by Allen (1).

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NOTES AND NEWS

DR. WALTER S. HUNTER, professor of psychology at Clark University, has been elected to the National Academy of Science.

THE Social Science Research Council has announced the appointment of fourteen Post-Doctoral Research Training Fellows and twenty-six Pre-Doctoral Field Fellows with stipends totaling \$88,000, and the award of forty-nine grants-in-aid of research, totaling \$22,725, for 1935-1936.

Among the Post-Doctoral Research Training Fellows are EUGENE LERNER, candidate for Ph.D. and Gilder Fellow in Social Science, Columbia University; and NEAL E. MILLER, candidate for Ph.D. and assistant in psychology, Yale University. Among the Pre-Doctoral Field Fellows is EUGENE L. HOROWITZ from Columbia University.

Among those who will receive the grants-in-aid are: JESSIE and LUTHER L. BERNARD, Department of Sociology, Washington University, for a study of the reception of the theories of Auguste Comte and of positivism in the United States; C. R. CARPENTER, lecturer and fellow, Bard College, for a study of aggressive behavior in nursery school children; THOMAS R. GARTH, professor of psychology, University of Denver, for a study of the intelligence of foster Indian children in white homes; EUGENIA HANFMANN, research worker, Worcester State Hospital, for a study of the psychological situation of the patients in hospitals for mental diseases; OTTO KLINEBERG, instructor in psychology and anthropology, Columbia University, for a study of emotional expression among the Chinese; MARIA A. RICKERS-OVSIANKINA, research associate, Worcester State Hospital, for a study of schizophrenic and normal subjects as to their resumption of interrupted tasks; and HARRY P. WELD, professor of psychology, Cornell University, for a study of social-psychological sanctions of the criminal law in England.

SPECIAL NOTICE

After August 1 all manuscripts, books for review, and correspondence concerning the *PSYCHOLOGICAL BULLETIN* should be sent to the editor, Professor John A. McGeoch, at the Department of Psychology, Wesleyan University, Middletown, Connecticut.

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